

What is claimed is:

1. A radio data communications method in which at least one of a first radio network controller and a second radio network controller performs a soft handover process for allowing soft handover of a mobile terminal, when the mobile terminal is performing the soft handover, wherein:

a radio network controller performing the soft handover process is changed when the mobile terminal is performing the soft handover.

2. The radio data communications method as set forth in claim 1, wherein:

the soft handover process in downlink radio data communications in which the first radio network controller transmits data to the mobile terminal via the second radio network controller and a base station comprising the steps of:

determining a first transmission timing of transmitting the data to all base stations to which the mobile terminal is connected when performing the soft handover;

dividing the data and providing a sequence number to each of the data fragments; and

transmitting the data fragments to all the base stations at the first transmission timing.

3. The radio data communications method as set forth in claim 2, wherein:

a server determines that the first radio network controller should perform the soft handover process together with the second radio network controller according to a

notification from the mobile terminal, when the second radio network controller performs the soft handover process;

the server notifies the first radio network controller and the second radio network controller of the determination;

5 the first radio network controller takes over a sequence number providing status from the second radio network controller;

the first radio network controller determines a second transmission timing of transmitting the data to the second radio
10 network controller;

the first radio network controller provides the sequence number to each of the data fragments, based on the sequence number providing status;

the first radio network controller transmits the data
15 fragments to the second radio network controller at the second transmission timing;

the first radio network controller transmits, at the first transmission timing, the data fragments to a base station managed by the first radio network controller among base
20 stations to which the mobile terminal is connected when performing the soft handover; and

the second radio network controller transmits, at the first transmission timing, the data fragments from the first radio network controller to a base station managed by the second
25 radio network controller among the base stations to which the mobile terminal is connected when performing the soft handover.

4. The radio data communications method as set forth in claim 2, wherein:

a server determines that the first radio network controller should not perform the soft handover process according to a notification from the mobile terminal, when the first radio network controller and the second radio network controller perform the soft handover process;

the server notifies the first radio network controller and the second radio network controller of the determination;

the first radio network controller transmits the data to the second radio network controller without dividing the data and without providing the sequence number to the data;

the second radio network controller divides the data and provides the sequence number to each of the data fragments based on the sequence number providing status of the first radio network controller, when detecting that the data from the first radio network controller is not divided or is not provided with the sequence number;

the second radio network controller transmits, at the first transmission timing, the data fragments to all base stations to which the mobile terminal is connected when performing the soft handover.

5. The radio data communications method as set forth in claim 2, wherein:

a server determines that the second radio network controller should not perform the soft handover process according to a notification from the mobile terminal, when the first radio network controller and the second radio network controller perform the soft handover process;

the server notifies the first radio network controller

and the second radio network controller of the determination;

the first radio network controller divides the data and provides the sequence number to each of the data fragments; and

the first radio network controller transmits, at the
5 first transmission timing, the data fragments to all base stations to which the mobile terminal is connected when performing the soft handover.

6. The radio data communications method as set forth in claim
10 2, wherein:

a server determines that the second radio network controller should perform the soft handover process together with the first radio network controller according to a notification from the mobile terminal, when the first radio
15 network controller performs the soft handover process;

the server notifies the first radio network controller and the second radio network controller of the determination;

the first radio network controller determines a second transmission timing of transmitting the data to the second radio
20 network controller;

the first radio network controller divides the data and provides the sequence number to each of the data fragments;

the first radio network controller transmits the data fragments to the second radio network controller at the second
25 transmission timing;

the first radio network controller transmits, at the first transmission timing, the data fragments to a base station managed by the first radio network controller among base stations to which the mobile terminal is connected when

performing the soft handover; and

the second radio network controller transmits, at the first transmission timing, the data fragments from the first radio network controller to base stations managed by the second radio network controller among the base stations to which the mobile terminal is connected when performing the soft handover.

7. The radio data communications method as set forth in claim 1, wherein:

the soft handover process in uplink radio data communications in which a mobile terminal transmits data to the first radio network controller via a base station and the second radio network controller comprising the steps of:

performing selective combining of data fragments from all base stations to which the mobile terminal is connected when performing the soft handover; and

reconstructing the data from the selectively combined data fragments.

8. The radio data communications method as set forth in claim 7, wherein:

a server determines that the first radio network controller should perform the soft handover process together with the second radio network controller according to a notification from the mobile terminal, when the second radio network controller performs the soft handover process;

the server notifies the first radio network controller and the second radio network controller of the determination;

the second radio network controller performs a selective

combining of the data fragments from base stations managed by the second radio network controller among base stations to which the mobile terminal is connected when performing the soft handover;

5 the first radio network controller performs a selective combining of the selectively combined data fragments from the second radio network controller, and the data fragments from a base station managed by the first radio network controller among the base stations to which the mobile terminal is
10 connected when performing the soft handover; and

 the first radio network controller reconstructs the data from the selectively combined data fragments.

9. The radio data communications method as set forth in claim
15 7, wherein:

 a server determines that the first radio network controller should not perform the soft handover process according to a notification from the mobile terminal, when the first radio network controller and the second radio network
20 controller perform the soft handover process;

 the server notifies the first radio network controller and the second radio network controller of the determination;

 the second radio network controller performs a selectively combining of the data fragments from base stations
25 managed by the second radio network controller among base stations to which the mobile terminal is connected when performing the soft handover;

 the second radio network controller reconstructs the data from the selectively combined data fragments, and notifies the

first radio network controller of the fact; and

the first radio network controller stops the selective combining and reconstruction of the data fragments in response to the notification from the second radio network controller.

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10. The radio data communications method as set forth in claim 7, wherein:

a server determines that the second radio network controller should not perform the soft handover process according to a notification from the mobile terminal, when the first radio network controller and the second radio network controller perform the soft handover process;

the server notifies the first radio network controller and the second radio network controller of the determination;

15 the second radio network controller stops the selective combining of the data fragments from base stations managed by the second radio network controller among base stations to which the mobile terminal is connected when performing the soft handover, and transfers the data fragments to the first radio network controller;

20 the first radio network controller performs the selective combining of the data fragments transferred from the second radio network controller, and the data fragments from a base station managed by the first radio network controller among the base stations to which the mobile terminal is connected when performing the soft handover; and

25 the first radio network controller reconstructs the data from the selectively combined data fragments.

11. The radio data communications method as set forth in claim 7, wherein:

a server determines that the second radio network controller should perform the soft handover process together with the first radio network controller according to a notification from the mobile terminal, when the first radio network controller performs the soft handover process;

the server notifies the first radio network controller and the second radio network controller of the determination;

the second radio network controller performs the selective combining of the data fragments from base stations managed by the second radio network controller among base stations to which the mobile terminal is connected when performing the soft handover, in response to the notification from the server;

the first radio network controller performs the selective combining of the selectively combined data fragments from the second radio network controller, and the data fragments from a base station managed by the first radio network controller among the base stations to which the mobile terminal is connected when performing the soft handover; and

the first radio network controller reconstructs the data from the selectively combined data fragments.

12. A server for controlling a radio data communications method in which at least one of a first radio network controller and a second radio network controller performs a soft handover process for allowing soft handover of a mobile terminal, when the mobile terminal is performing the soft handover, in downlink

radio data communications in which the first radio network controller transmits data to the mobile terminal via the second radio network controller and a base station, or in uplink radio data communications in which the mobile terminal transmits data to the first radio network controller via the base station and the second radio network controller, the server comprising:

a determiner configured to determine a change of the radio network controller performing the soft handover process when the mobile terminal is performing the soft handover, according to a notification from the mobile terminal; and

a notification provider configured to notify radio network controllers related to the change of the determination.

13. A radio network controller for performing a soft handover process for allowing soft handover of a mobile terminal, when the mobile terminal is performing soft handover, in downlink radio data communications in which data is transmitted to the mobile terminal via a base station, the radio network controller comprising:

a notification receiver configured to receive a notification instructing the radio network controller to perform the soft handover process as a first radio network controller;

a data divider configured to divide the data in response to the notification;

a sequence number provider configured to provide a sequence number to each of the data fragments, based on a sequence number providing status, in response to the notification;

a transmission timing determiner configured to determine a first transmission timing of transmitting the data to a base station managed by the radio network controller among base stations to which the mobile terminal is connected when performing the soft handover, and to determine a second transmission timing of transmitting the data to a second radio network controller, in response to the notification; and

a data transmitter configured to transmit data fragments to the second radio network controller at the second transmission timing, and to transmit at the first transmission timing the data fragments to the base station managed by the radio network controller among the base stations to which the mobile terminal is connected when performing the soft handover, in response to the notification.

14. The radio network controller as set forth in claim 13, wherein:

the data transmitter adds information requesting the sequence number providing status to the data fragment for transmission to the second radio network controller; and

the sequence number provider takes over the sequence number providing status, according to a sequence number provided to the data fragment added with the information requesting the sequence number providing status notified by the second radio network controller, and the number of data fragments transmitted until receiving the sequence number since transmitting the data fragment added with the information requesting the sequence number providing status.

15. A radio network controller for performing a soft handover process for allowing soft handover of a mobile terminal, when the mobile terminal is performing soft handover, in downlink radio data communications in which data is transmitted to the mobile terminal via a base station, the radio network controller
5 comprising:

a notification receiver configured to receive a notification instructing the radio network controller to perform the soft handover process as a second radio network
10 controller;

a transmission timing determiner configured to determine a first transmission timing of transmitting the data to base stations managed by the radio network controller among base stations to which the mobile terminal is connected when
15 performing the soft handover, in response to the notification; and

a data transmitter configured to transmit, at the first transmission timing, data fragments from a first radio network controller to the base stations managed by the radio network
20 controller among the base stations to which the mobile terminal is connected when performing the soft handover, in response to the notification.

16. A radio network controller for performing a soft handover process for allowing soft handover of a mobile terminal, when
25 the mobile terminal is performing the soft handover, in downlink radio data communications in which data is transmitted to the mobile terminal via a base station, the radio network controller comprising:

a notification receiver configured to receive a notification instructing the radio network controller not to perform the soft handover process; and

a data transmitter configured to transfer the data
5 without dividing the data, in response to the notification.

17. A radio network controller for performing a soft handover process for allowing soft handover of a mobile terminal, when the mobile terminal is performing the soft handover, in uplink
10 radio data communications in which the mobile terminal transmits data via a base station, the radio network controller comprising:

a notification receiver configured to receive a notification instructing the radio network controller to
15 perform the soft handover process as a first radio network controller;

a selective combiner configured to perform selective combining of data fragments from all base stations to which the mobile terminal is connected when performing the soft handover,
20 in response to the notification; and

a reconstructor configured to reconstruct the data from the selectively combined data fragments, in response to the notification.

25 18. A radio network controller for performing a soft handover process for allowing soft handover of a mobile terminal, when the mobile terminal is performing the soft handover, in uplink radio data communications in which the mobile terminal transmits data via a base station, the radio network controller

comprising:

a notification receiver configured to receive a notification instructing the radio network controller to perform the soft handover process;

5 a selective combiner configured to perform selective combining of data fragments from base stations managed by the radio network controller among all base stations to which the mobile terminal is connected when performing the soft handover, in response to the notification; and

10 a data transmitter configured to transmit the selectively combined data fragments to a first radio network controller in response to the notification.

19. A radio network controller for performing a soft handover process for allowing soft handover of a mobile terminal, when
15 the mobile terminal is performing the soft handover, in uplink radio data communications in which the mobile terminal transmits data via a base station, the radio network controller comprising:

20 a notification receiver configured to receive a notification instructing the radio network controller not to perform the soft handover process; and

a data transmitter configured to transmit to a first radio network controller data fragments from a base station managed
25 by the radio network controller among all base stations to which the mobile terminal is connected when performing the soft handover, without performing selective combining, in response to the notification.